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NOVA SCOTIA
Transportation and Public Works
Environmental Services

RADIONUCLIDE MONITORING PROGRAM FOR DRINKING WATER IN NOVA SCOTIA SCHOOLS – SEPTEMBER 2002 NOVA SCOTIA DEPARTMENT OF EDUCATION

Prepared For:

Nova Scotia Dept. of Education

Prepared by:

Environmental Services
Nova Scotia Dept. of Transportation and Public Works
Halifax, N.S.
November 2002

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1.0 BACKGROUND

At the request of the Nova Scotia Department of Education (NSDOE), the Environmental Services section of the Nova Scotia Department of Transportation and Public Works (NSDTPW) was asked to coordinate the collection and reporting of the water sampling for the Radionuclide Monitoring Program for Drinking Water in Nova Scotia Schools.

This report includes the results from the Fall (September) 2002 round of sampling. Water samples were collected from 145 schools, province wide, from the seven school boards and from P3 schools. It is our understanding that all samples were collected according to the Special Water Advisory Group (SWAG) sampling requirements.

Samples were delivered to PSC Analytical Services in Bedford and the Environmental Services Laboratory at the Queen Elizabeth II Health Sciences Centre in Halifax. Laboratory personnel preserved the samples with nitric acid. Samples from both laboratories were submitted to SRC Analytical (SRC) in Saskatoon, Saskatchewan. SRC held the samples for 30 days prior to testing, as per their recommended laboratory procedure. The sample from St. Margaret's Bay Elementary School was not held for 30 days as it was collected prior to the Special Well-Water Advisory Group (SWAG) decision to follow the 30 day protocol. Samples were analysed for Radium-226, Lead-210 and total Uranium. Laboratory certificates of analysis are included in Appendix B.

2.0 RESULTS

The results from the Fall (September) 2002 round of water sampling are grouped according to school board and are included in Tables 1 through 8 in Appendix A. Results from previous sampling programs were included in the tables for comparison purposes. Analytical results were compared to the 2002 Canadian Drinking Water Quality Guidelines (CDWQG). A Total Activity Sum was calculated using the procedure defined in the CDWQG. The total Uranium results were converted from a concentration (mg/L) to an activity (Bq/L) using the CDWQG relationship that states that for

natural Uranium 0.02 mg/L is about 0.5 Bq/L. The calculated activities were divided by the maximum acceptable concentration (MAC) for Uranium (4 Bq/L) and included in the activity sum.

In summary, results from the Conseil Scolaire Acadien Provincial were all below guideline levels with the exception of the sample from Ecole Pomquet which reported Lead-210 at 0.18 Bq/L an exceedance of 0.1 Bq/L guideline.

3.0 QA/QC

The analytical QA/QC program consisted of the collection of a duplicate water sample at one school in each of the seven school boards. As well, a blank water sample was submitted with the sample set from each of the seven school boards. The water for the blank samples was de-ionized water supplied by the laboratories. All of the blank samples reported levels below detection with the exception of the blank from the Conseil Scolaire Acadien Provincial which reported a total Uranium of 0.07 µg/L which the laboratory rounded to 0.1µg/L.

The original and duplicate samples reported percent differences that ranged from 0 to 13 % with the exception of the original and duplicate Lead-210 results from Cabot High School which reported a percent difference of 33%. The results are acceptable and indicative of consistent laboratory analytical procedure.

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APPENDIX A

TABLES OF ANALYTICAL RESULTS

TABLE 1 - CONSEIL SCOLAIRE ACADIEN PROVINCIAL

Parameter	Units	Sample Date	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02	04-Sep-02
		School ID	744	158	434	218	217	378
		Canadian Drinking Water Quality Guidelines (MAC) (1)	ECOLE BELLEVILLE	ECOLE BUTTES-AMIRAULT	ECOLE DE LA RIVE SUD	ECOLE JEAN-MARIE-GAY	ECOLE JOSEPH-DUGAS	ECOLE NDA CHETICAMP
Radium-226	Bq/L	0.6	0.01	< 0.005	0.02	0.007	0.01	<0.005
Lead-210	Bq/L	0.1	< 0.02	0.03	< 0.02	< 0.02	0.04	<0.02
Total Uranium	µg/L	20	< 0.1	< 0.1	< 0.1	< 0.1	0.2	1.2
Total Activity Sum (2)	---	**≤ 1.0**	**0.02**	**0.30**	**0.03**	**0.01**	**0.42**	**0.01**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion factor
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 1 - CONSEIL SCOLAIRE ACADIEN PROVINCIAL

Parameter	Units	Sample Date	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02
		School ID	378	145	156	221	980	
		Canadian Drinking Water Quality Guidelines (MAC) (1)	ECOLE NDA CHETICAMP	ECOLE POMQUET	ECOLE PUBNICO-OUEST	ECOLE SAINT-ALBERT	ECOLE SECONDAIRE DE PAR-EN-BAS	E.S.D.C. (ECOLE SECONDAIRE DE CLARE)
Radium-226	Bq/L	0.6	< 0.005	0.008	< 0.005	0.006	< 0.005	< 0.005
Lead-210	Bq/L	0.1	< 0.02	0.18	0.02	< 0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	1.3	< 1	< 0.1	0.1	< 0.1	0.5
Total Activity Sum (2)	---	**≤ 1.0**	**0.01**	**1.81**	**0.20**	**0.01**	**0.00**	**0.00**

TABLE 1 - CONSEIL SCOLAIRE ACADIEN PROVINCIAL

Parameter	Units	Sample Date	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02
		School ID	378	145	156	221	980	
		Canadian Drinking Water Quality Guidelines (MAC) (1)	ECOLE NDA CHETICAMP	ECOLE POMQUET	ECOLE PUBNICO-OUEST	ECOLE SAINT-ALBERT	ECOLE SECONDAIRE DE PAR-EN-BAS	E.S.D.C. (ECOLE SECONDAIRE DE CLARE)
Radium-226	Bq/L	0.6	< 0.005	0.008	< 0.005	0.006	< 0.005	< 0.005
Lead-210	Bq/L	0.1	< 0.02	0.18	0.02	< 0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	1.3	< 1	< 0.1	0.1	< 0.1	0.5
Total Activity Sum (2)	---	**≤ 1.0**	**0.01**	**1.81**	**0.20**	**0.01**	**0.00**	**0.00**

TABLE 1 - CONSEIL SCOLAIRE ACADIEN PROVINCIAL

Parameter	Units	Sample Date	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02
		School ID	219	219	160		
		Canadian Drinking Water Quality Guidelines (MAC) (1)	BUREAU SIEGE (METHEGHAN)	ECOLE STELLA-MARIS	ECOLE WEDGEPORT	ECOLE ROBERT THERIAULT (Duplicate)	GUY LEBLANC ELEMENTARY (Blank)
Radium-226	Bq/L	0.6	< 0.005	< 0.005	0.006	< 0.005	< 0.005
Lead-210	Bq/L	0.1	< 0.02	< 0.02	0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	< 0.1	< 0.1	< 0.1	< 0.1	0.1
Total Activity Sum (2)	---	**≤ 1.0**	**0.00**	**0.00**	**0.21**	**0.00**	**0.00**

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This report includes the results from the Fall (September) 2002 round of sampling. Water samples were collected from 145 schools, province wide, from the seven school boards and from P3 schools. It is our understanding that all samples were collected according to the Special Water Advisory Group (SWAG) sampling requirements.

Samples were delivered to PSC Analytical Services in Bedford and the Environmental Services Laboratory at the Queen Elizabeth II Health Sciences Centre in Halifax. Laboratory personnel preserved the samples with nitric acid. Samples from both laboratories were submitted to SRC Analytical (SRC) in Saskatoon, Saskatchewan. SRC held the samples for 30 days prior to testing, as per their recommended laboratory procedure. The sample from St. Margaret's Bay Elementary School was not held for 30 days as it was collected prior to the Special Well-Water Advisory Group (SWAG) decision to follow the 30 day protocol. Samples were analysed for Radium-226, Lead-210 and total Uranium. Laboratory certificates of analysis are included in Appendix B.

2.0 RESULTS

The results from the Fall (September) 2002 round of water sampling are grouped according to school board and are included in Tables 1 through 8 in Appendix A. Results from previous sampling programs were included in the tables for comparison purposes. Analytical results were compared to the 2002 Canadian Drinking Water Quality Guidelines (CDWQG). A Total Activity Sum was calculated using the procedure defined in the CDWQG. The total Uranium results were converted from a concentration (mg/L) to an activity (Bq/L) using the CDWQG relationship that states that for

natural Uranium 0.02 mg/L is about 0.5 Bq/L. The calculated activities were divided by the maximum acceptable concentration (MAC) for Uranium (4 Bq/L) and included in the activity sum.

In summary, analytical results from the Annapolis Valley Regional School Board were all below guidelines with the exception of Springfield Consolidated and the duplicate sample from Springfield (David Floyd) which both reported Lead-210 at 0.12 Bq/L.

3.0 QA/QC

The analytical QA/QC program consisted of the collection of a duplicate water sample at one school in each of the seven school boards. As well, a blank water sample was submitted with the sample set from each of the seven school boards. The water for the blank samples was de-ionized water supplied by the laboratories. All of the blank samples reported levels below detection with the exception of the blank from the Conseil Scolaire Acadien Provincial which reported a total Uranium of 0.07 µg/L which the laboratory rounded to 0.1µg/L.

The original and duplicate samples reported percent differences that ranged from 0 to 13 % with the exception of the original and duplicate Lead-210 results from Cabot High School which reported a percent difference of 33%. The results are acceptable and indicative of consistent laboratory analytical procedure.

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APPENDIX A

TABLES OF ANALYTICAL RESULTS

TABLE 2 -ANNAPOLIS VALLEY REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	75	363	67	732	366
		Canadian Drinking Water Quality Guidelines (MAC) (1)	BERWICK AND DISTRICT SCHOOL	BROOKLYN DISTRICT	CENTRAL KINGS	COLDBROOK AND DISTRICT SCHOOL	DR ARTHUR HINES SCHOOL
Radium-226	Bq/L	0.6	0.009	0.01	< 0.005	< 0.005	< 0.005
Lead-210	Bq/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	0.7	1.2	4.1	< 0.1	0.5
Total Activity Sum (2)	---	≤ **1.0**	**0.02**	**0.02**	**0.03**	**0.00**	**0.00**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion fact
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 2 -ANNAPOLIS VALLEY REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	60	365	62	61	125
		Canadian Drinking Water Quality Guidelines (MAC) (1)	GASPEREAU VALLEY	HANTS WEST RURAL HIGH SCHOOL	KINGSTON ELEMENTARY SCHOOL	L E SHAW ELEMENTARY SCHOOL	MARGARETVILLE
Radium-226	Bq/L	0.6	0.01	0.02	< 0.005	< 0.005	< 0.005
Lead-210	Bq/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	0.8	1.5	0.1	0.2	0.1
Total Activity Sum (2)	---	**≤ 1.0**	**0.02**	**0.04**	**0.00**	**0.00**	**0.00**

or

TABLE 2 -ANNAPOLIS VALLEY REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	364	55	54	71	361
		Canadian Drinking Water Quality Guidelines (MAC) (1)	NEWPORT STATION	SOMERSET AND DISTRICT	ST MARY'S ELEMENTARY	WEST KINGS DISTRICT	WINDSOR FORKS DISTRICT SCHOOL
Radium-226	Bq/L	0.6	0.01	< 0.005	0.006	< 0.005	< 0.005
Lead-210	Bq/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	< 1	15	0.1	2.3	0.3
Total Activity Sum (2)	---	≤ 1.0	**0.02**	**0.09**	**0.01**	**0.01**	**0.00**

TABLE 2 -ANNAPOLIS VALLEY REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	134		
		Canadian Drinking Water Quality Guidelines (MAC) (1)	SPRINGFIELD CONSOLIDATED	DAVID FLOYD CONSOLIDATED (Duplicate)	JAMES GUNN ELEMENTARY Blank
Radium-226	Bq/L	0.6	0.03	0.03	< 0.005
Lead-210	Bq/L	0.1	0.12	0.12	< 0.02
Total Uranium	µg/L	20	7.9	7.3	< 0.1
Total Activity Sum (2)	---	≤ 1.0	**1.30**	**1.30**	**0.00**

TABLE 2 -ANNAPOLIS VALLEY REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	134		
		Canadian Drinking Water Quality Guidelines (MAC) (1)	SPRINGFIELD CONSOLIDATED	DAVID FLOYD CONSOLIDATED (Duplicate)	JAMES GUNN ELEMENTARY Blank
Radium-226	Bq/L	0.6	0.03	0.03	< 0.005
Lead-210	Bq/L	0.1	0.12	0.12	< 0.02
Total Uranium	µg/L	20	7.9	7.3	< 0.1
Total Activity Sum (2)	---	≤ **1.0**	**1.30**	**1.30**	**0.00**

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1.0 BACKGROUND

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This report includes the results from the Fall (September) 2002 round of sampling. Water samples were collected from 145 schools, province wide, from the seven school boards and from P3 schools. It is our understanding that all samples were collected according to the Special Water Advisory Group (SWAG) sampling requirements.

Samples were delivered to PSC Analytical Services in Bedford and the Environmental Services Laboratory at the Queen Elizabeth II Health Sciences Centre in Halifax. Laboratory personnel preserved the samples with nitric acid. Samples from both laboratories were submitted to SRC Analytical (SRC) in Saskatoon, Saskatchewan. SRC held the samples for 30 days prior to testing, as per their recommended laboratory procedure. The sample from St. Margaret's Bay Elementary School was not held for 30 days as it was collected prior to the Special Well-Water Advisory Group (SWAG) decision to follow the 30 day protocol. Samples were analysed for Radium-226, Lead-210 and total Uranium. Laboratory certificates of analysis are included in Appendix B.

2.0 RESULTS

The results from the Fall (September) 2002 round of water sampling are grouped according to school board and are included in Tables 1 through 8 in Appendix A. Results from previous sampling programs were included in the tables for comparison purposes. Analytical results were compared to the 2002 Canadian Drinking Water Quality Guidelines (CDWQG). A Total Activity Sum was calculated using the procedure defined in the CDWQG. The total Uranium results were converted from a concentration (mg/L) to an activity (Bq/L) using the CDWQG relationship that states that for

natural Uranium 0.02 mg/L is about 0.5 Bq/L. The calculated activities were divided by the maximum acceptable concentration (MAC) for Uranium (4 Bq/L) and included in the activity sum.

In summary, all samples from the Cape Breton – Victoria Regional School Board were below guidelines with the exception of the duplicate sample from Cabot High School (DK Matheson) which reported a Total Activity Sum of 1.04 exceeding the recommended maximum of 1. The original sample from Cabot High School reported a Total Activity Sum of 0.85. The original and the duplicated reported the presence of Radium-226, Lead-210, and total Uranium at levels below guidelines, however, the combination of activities exceeded the Total Activity Sum.

3.0 QA/QC

The analytical QA/QC program consisted of the collection of a duplicate water sample at one school in each of the seven school boards. As well, a blank water sample was submitted with the sample set from each of the seven school boards. The water for the blank samples was de-ionized water supplied by the laboratories. All of the blank samples reported levels below detection with the exception of the blank from the Conseil Scolaire Acadien Provincial which reported a total Uranium of 0.07 µg/L which the laboratory rounded to 0.1µg/L.

The original and duplicate samples reported percent differences that ranged from 0 to 13 % with the exception of the original and duplicate Lead-210 results from Cabot High School which reported a percent difference of 33%. The results are acceptable and indicative of consistent laboratory analytical procedure.

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APPENDIX A

TABLES OF ANALYTICAL RESULTS

TABLE 3 -CAPE BRETON-VICTORIA REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	188	93	962	95	196
		Canadian Drinking Water Quality Guidelines (MAC) (1)	BALL'S CREEK	BOULARDERIE CONSOLIDATED (BOULAC MARIE)	CAPE SMOKEY ELEMENTARY SCHOOL	CHRISTMAS ISLAND CONSOLIDATED	EAST BAY COMPLEX
Radium-226	Bq/L	0.6	< 0.005	< 0.005	0.03	< 0.005	< 0.005
Lead-210	Bq/L	0.1	< 0.02	< 0.02	0.05	< 0.02	< 0.02
Total Uranium	µg/L	20	0.2	0.1	12	1.6	3.7
Total Activity Sum (2)	---	**≤ 1.0**	**0.00**	**0.00**	**0.63**	**0.01**	**0.02**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion factor
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 3 -CAPE BRETON-VICTORIA REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	102	177	194	172	202
		Canadian Drinking Water Quality Guidelines (MAC) (1)	GEORGES RIVER SCHOOL	GOWRIE MEMORIAL SCHOOL	GRAND MIRA	LAKEVALE SCHOOL	MALCOLM MUNROE MEMORIAL
Radium-226	Bq/L	0.6	< 0.005	0.01	< 0.005	< 0.005	< 0.005
Lead-210	Bq/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Activity Sum (2)	---	≤ 1.0	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**

TABLE 3 -CAPE BRETON-VICTORIA REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	183	83	13	961	87
		Canadian Drinking Water Quality Guidelines (MAC) (1)	MARION BRIDGE SCHOOL	MIDDLE RIVER	MOUNTAINVIEW	NORTH HIGHLAND ELEMENTARY SCHOOL	NORTH SHORE
Radium-226	Bq/L	0.6	0.02	< 0.005	< 0.005	0.01	0.007
Lead-210	Bq/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	0.1	0.4	0.1	1.4	0.3
Total Activity Sum (2)	—	≤ **1.0**	**0.03**	**0.00**	**0.00**	**0.03**	**0.01**

TABLE 3 -CAPE BRETON-VICTORIA REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	95	973	185	107	
		Canadian Drinking Water Quality Guidelines (MAC) (1)	RANKIN MEMORIAL SCHOOL	RIVERSIDE ELEMENTARY	SYDNEY RIVER ELEMENTARY	CABOT HIGH SCHOOL	DK MATHESON HIGH (Duplicate)
Radium-226	Bq/L	0.6	< 0.005	< 0.005	< 0.005	0.08	0.07
Lead-210	Bq/L	0.1	< 0.02	< 0.03	< 0.02	0.06	0.08
Total Uranium	µg/L	20	0.8	0.1	< 0.1	18	19
Total Activity Sum (2)	---	**≤ 1.0**	**0.01**	**0.00**	**0.00**	**0.85**	**1.04**

TABLE 3 -CAPE BRETON-VICTORIA REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	95	973	185	107	
		Canadian Drinking Water Quality Guidelines (MAC) (1)	RANKIN MEMORIAL SCHOOL	RIVERSIDE ELEMENTARY	SYDNEY RIVER ELEMENTARY	CABOT HIGH SCHOOL	DK MATHESON HIGH (Duplicate)
Radium-226	Bq/L	0.6	< 0.005	< 0.005	< 0.005	0.08	0.07
Lead-210	Bq/L	0.1	< 0.02	< 0.03	< 0.02	0.06	0.08
Total Uranium	µg/L	20	0.8	0.1	< 0.1	18	19
Total Activity Sum (2)	---	**< 1.0**	**0.01**	**0.00**	**0.00**	**0.85**	**1.04**

TABLE 3 -CAPE BRETON-VICTORIA REGIONAL

Parameter	Units	Sample Date	18-Sep-02
		School ID	
		Canadian Drinking Water Quality Guidelines (MAC) (1)	ED DAVIS ELEMENTARY (Blank)
Radium-226	Bq/L	0.6	< 0.005
Lead-210	Bq/L	0.1	< 0.02
Total Uranium	µg/L	20	< 0.1
Total Activity Sum (2)	---	**≤ 1.0**	**0.00**

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natural Uranium 0.02 mg/L is about 0.5 Bq/L. The calculated activities were divided by the maximum acceptable concentration (MAC) for Uranium (4 Bq/L) and included in the activity sum.

In summary, results from the Chignecto Central Region School Board were all below guideline values with the exception of the samples from River John Consolidated School which reported Lead-210 at 0.16 Bq/L, and Uniacke District School which reported Lead-210 at 0.12, both of which exceed the 0.1 Bq/L guideline

3.0 QA/QC

The analytical QA/QC program consisted of the collection of a duplicate water sample at one school in each of the seven school boards. As well, a blank water sample was submitted with the sample set from each of the seven school boards. The water for the blank samples was de-ionized water supplied by the laboratories. All of the blank samples reported levels below detection with the exception of the blank from the Conseil Scolaire Acadien Provincial which reported a total Uranium of 0.07 µg/L which the laboratory rounded to 0.1µg/L.

The original and duplicate samples reported percent differences that ranged from 0 to 13 % with the exception of the original and duplicate Lead-210 results from Cabot High School which reported a percent difference of 33%. The results are acceptable and indicative of consistent laboratory analytical procedure.

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APPENDIX A

TABLES OF ANALYTICAL RESULTS

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	18-Sep-02	17-Sep-02	17-Sep-02	17-Sep-02	18-Sep-02	18-Sep-02
		School ID	248	6	2	7	22	16
		Canadian Drinking Water Quality Guidelines (MAC) (1)	ADVOCATE DISTRICT SCHOOL	BIBLE HILL CENTRAL SCHOOL	BIBLE HILL EAST COURT ROAD	BIBLE HILL JUNIOR HIGH SCHOOL	BROOKFIELD JUNIOR HIGH SCHOOL	BROOKFIELD MEMORIAL SCHOOL
Radium-226	Bq/L	0.6	<0.005	<0.005	0.006	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Total Uranium	µg/L	20	<5	<5	<5	<5	<5	<5
Total Activity Sum (2)	---	**≤ 1.0**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion factor
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	17-Sep-02	17-Sep-02	19-Sep-02	19-Sep-02	18-Sep-02	18-Sep-02
		School ID	20	27	14	36	230	432
		Canadian Drinking Water Quality Guidelines (MAC) (1)	CENTRAL COLCHESTER JR. HIGH	CHIGANOIS ELEMENTARY SCHOOL	COBEQUID CONSOLIDATED	COBEQUID DISTRICT	CYRUS EATON ELEMENTARY SCHOOL	EAST PICTOU RURAL HIGH SCHOOL
Radium-226	Bq/L	0.6	0.008	<0.005	<0.005	0.007	0.01	0.007
Lead-210	Bq/L	0.1	0.02	<0.020	<0.020	0.06	0.06	<0.020
Total Uranium	µg/L	20	<5	<5	<5	15	16	6
Total Activity Sum (2)	---	≤ 1.0	**0.21**	**0.00**	**0.00**	**0.71**	**0.72**	**0.05**

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	18-Sep-02	17-Sep-02	18-Sep-02	17-Sep-02	18-Sep-02	18-Sep-02
		School ID	17	23	414	26	42	15
		Canadian Drinking Water Quality Guidelines (MAC) (1)	EAST STEWIACKE ELEMENTARY	FIVE ISLAND ELEMENTARY	F. H. MACDONALD ELEMENTARY SCHOOL	GREAT VILLAGE ELEMENTARY	HANTS EAST RURAL HIGH SCHOOL	HILDEN SCHOOL
Radium-226	Bq/L	0.6	<0.005	<0.005	<0.005	<0.005	0.02	<0.005
Lead-210	Bq/L	0.1	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Total Uranium	µg/L	20	6	<5	<5	<5	<5	<5
Total Activity Sum (2)	---	**≤ 1.0**	**0.04**	**0.00**	**0.00**	**0.00**	**0.03**	**0.00**

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	19-Sep-02	18-Sep-02	18-Sep-02	17-Sep-02	18-Sep-02	18-Sep-02
		School ID	35		19	9	231	252
		Canadian Drinking Water Quality Guidelines (MAC) (1)	MAITLAND DISTRICT SCHOOL	MAPLE LEAF SALMON RIVER - ADULT HIGH	MIDDLE STEWIACKE ELEM SCHOOL	NORTH RIVER ELEMENTARY SCHOOL	NORTHPORT CONSOLIDATED ELEMENTARY SCHOOL	PUGWASH DISTRICT HIGH SCHOOL
Radium-226	Bq/L	0.6	0.005	<0.005	<0.005	<0.005	0.008	<0.005
Lead-210	Bq/L	0.1	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Total Uranium	µg/L	20	13	<5	<5	<5	<5	14
Total Activity Sum (2)	---	≤ 1.0	**0.09**	**0.00**	**0.00**	**0.00**	**0.01**	**0.09**

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	19-Sep-02	17-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	39	916	435	251	923	11
		Canadian Drinking Water Quality Guidelines (MAC) (1)	RAWDON DISTRICT SCHOOL	REDCLIFF MIDDLE SCHOOL	RIVER JOHN CONSOLIDATED	RIVER HEBERT DISTRICT HIGH	RIVERSIDE EDUCATION CENTER (MILFORD)	SALMON RIVER ELEMENTARY
Radium-226	Bq/L	0.6	<0.005	<0.005	0.07	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	<0.020	<0.020	0.16	<0.020	<0.020	<0.020
Total Uranium	µg/L	20	7	7	19	<5	<5	<5
Total Activity Sum (2)	---	**≤ 1.0**	**0.04**	**0.04**	**1.84**	**0.00**	**0.00**	**0.00**

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	19-Sep-02	17-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02
		School ID	39	916	435	251	923	11
		Canadian Drinking Water Quality Guidelines (MAC) (1)	RAWDON DISTRICT SCHOOL	REDCLIFF MIDDLE SCHOOL	RIVER JOHN CONSOLIDATED	RIVER HEBERT DISTRICT HIGH	RIVERSIDE EDUCATION CENTER (MILFORD)	SALMON RIVER ELEMENTARY
Radium-226	Bq/L	0.6	<0.005	<0.005	0.07	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	<0.020	<0.020	0.16	<0.020	<0.020	<0.020
Total Uranium	µg/L	20	7	7	19	<5	<5	<5
Total Activity Sum (2)	---	**≤ 1.0**	**0.04**	**0.04**	**1.84**	**0.00**	**0.00**	**0.00**

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	25-Sep-02	18-Sep-02
		School ID	441	4	232	428	40	18
		Canadian Drinking Water Quality Guidelines (MAC) (1)	SALT SPRINGS ELEMENTARY SCHOOL	SCOTSBURN ELEMENTARY SCHOOL	SIR CHARLES TUPPER SCHOOL	THORBURN CONSOLIDATED SCHOOL	UNIACKE DISTRICT SCHOOL	UPPER STEWIACKE ELEMENTARY
Radium-226	Bq/L	0.6	0.02	<0.005	<0.005	0.01	0.008	<0.005
Lead-210	Bq/L	0.1	<0.020	<0.020	<0.020	<0.020	0.12	<0.020
Total Uranium	µg/L	20	<5	<5	<5	<5	12	<5
Total Activity Sum (2)	---	≤ 1.0	**0.03**	**0.00**	**0.00**	**0.02**	**1.29**	**0.00**

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	18-Sep-02	25-Sep-02	18-Sep-02
		School ID	441	4	232	428	40	18
		Canadian Drinking Water Quality Guidelines (MAC) (1)	SALT SPRINGS ELEMENTARY SCHOOL	SCOTSBURN ELEMENTARY SCHOOL	SIR CHARLES TUPPER SCHOOL	THORBURN CONSOLIDATED SCHOOL	UNIACKE DISTRICT SCHOOL	UPPER STEWIACKE ELEMENTARY
Radium-226	Bq/L	0.6	0.02	<0.005	<0.005	0.01	0.008	<0.005
Lead-210	Bq/L	0.1	<0.020	<0.020	<0.020	<0.020	0.12	<0.020
Total Uranium	µg/L	20	<5	<5	<5	<5	12	<5
Total Activity Sum (2)	---	**≤ 1.0**	**0.03**	**0.00**	**0.00**	**0.02**	**1.29**	**0.00**

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	18-Sep-02	17-Sep-02	17-Sep-02	18-Sep-02
		School ID	12	227	229	29	29	407
		Canadian Drinking Water Quality Guidelines (MAC) (1)	VALLEY ELEMENTARY SCHOOL	WALLACE CONSOLIDATED SCHOOL	WENTWORTH CONSOLIDATED ELEMENTARY	WEST COLCHESTER CONSOLIDATED BASS RIVER	BASS RIVER ELEMENTARY	WEST PICTOU CONSOLIDATED
Radium-226	Bq/L	0.6	<0.005	0.01	<0.005	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	<0.020	<0.30	<0.020	<0.020	<0.020	<0.020
Total Uranium	µg/L	20	<5	6	6	8	<5	<5
Total Activity Sum (2)	---	≤ 1.0	**0.00**	**0.05**	**0.04**	**0.05**	**0.00**	**0.00**

TABLE 4 - CHIGNECTO CENTRAL REGIONAL

Parameter	Units	Sample Date	18-Sep-02	19-Sep-02	19-Sep-02	19-Sep-02
		School ID	457	41		
		Canadian Drinking Water Quality Guidelines (MAC) (1)	WEST PICTOU DISTRICT HIGH	HANTS NORTH RURAL HIGH SCHOOL	DICK BESWICK ELEMENTARY Duplicate	GARY MILLER ELEMENTARY blank
Radium-226	Bq/L	0.6	<0.005	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	<0.020	<0.020	<0.020	<0.020
Total Uranium	µg/L	20	<5	<5	<5	<5
Total Activity Sum (2)	---	≤ 1.0	**0.00**	**0.00**	**0.00**	**0.00**

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NOVA SCOTIA
Transportation and Public Works
Environmental Services

RADIONUCLIDE MONITORING PROGRAM FOR DRINKING WATER IN NOVA SCOTIA SCHOOLS – SEPTEMBER 2002 NOVA SCOTIA DEPARTMENT OF EDUCATION

Prepared For:

Nova Scotia Dept. of Education

Prepared by:

Environmental Services
Nova Scotia Dept. of Transportation and Public Works
Halifax, N.S.
November 2002

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1.0 BACKGROUND

At the request of the Nova Scotia Department of Education (NSDOE), the Environmental Services section of the Nova Scotia Department of Transportation and Public Works (NSDTPW) was asked to coordinate the collection and reporting of the water sampling for the Radionuclide Monitoring Program for Drinking Water in Nova Scotia Schools.

This report includes the results from the Fall (September) 2002 round of sampling. Water samples were collected from 145 schools, province wide, from the seven school boards and from P3 schools. It is our understanding that all samples were collected according to the Special Water Advisory Group (SWAG) sampling requirements.

Samples were delivered to PSC Analytical Services in Bedford and the Environmental Services Laboratory at the Queen Elizabeth II Health Sciences Centre in Halifax. Laboratory personnel preserved the samples with nitric acid. Samples from both laboratories were submitted to SRC Analytical (SRC) in Saskatoon, Saskatchewan. SRC held the samples for 30 days prior to testing, as per their recommended laboratory procedure. The sample from St. Margaret's Bay Elementary School was not held for 30 days as it was collected prior to the Special Well-Water Advisory Group (SWAG) decision to follow the 30 day protocol. Samples were analysed for Radium-226, Lead-210 and total Uranium. Laboratory certificates of analysis are included in Appendix B.

2.0 RESULTS

The results from the Fall (September) 2002 round of water sampling are grouped according to school board and are included in Tables 1 through 8 in Appendix A. Results from previous sampling programs were included in the tables for comparison purposes. Analytical results were compared to the 2002 Canadian Drinking Water Quality Guidelines (CDWQG). A Total Activity Sum was calculated using the procedure defined in the CDWQG. The total Uranium results were converted from a concentration (mg/L) to an activity (Bq/L) using the CDWQG relationship that states that for

natural Uranium 0.02 mg/L is about 0.5 Bq/L. The calculated activities were divided by the maximum acceptable concentration (MAC) for Uranium (4 Bq/L) and included in the activity sum.

Exceedances in samples collected in the Halifax Regional School Board were reported from Atlantic Memorial – Terrance Bay with Lead-210 at 0.43 Bq/L, Brookside Jr. High with Lead-210 at 0.21 Bq/L, East St. Margaret's with Lead-210 at 0.49 Bq/L and total Uranium at 23 µg/L, Harrietsfield Elementary with Lead-210 at 0.28 Bq/L and total Uranium at 87 µg/L, Herring Cove Jr. High with Lead-210 at 0.19 Bq/L, Sir John A Macdonald with Lead-210 at 0.18 Bq/L, Tantallon Jr. High with Lead-210 at 0.49 Bq/L, Terrance Bay with Lead-210 at 0.65 Bq/L, William King Elementary with Lead-210 at 0.38 Bq/L, and Prospect Road Elementary and the Prospect Road duplicate (R Curran) which reported Lead-210 at 0.45 and 0.39 Bq/L, respectively.

In summary, all of the Halifax Regional School Board schools identified in the September round of testing as exceeding the Canadian Drinking Water Guidelines also failed in the June 2002 round. No new schools were identified with levels exceeding the Canadian Drinking Water Guidelines

3.0 QA/QC

The analytical QA/QC program consisted of the collection of a duplicate water sample at one school in each of the seven school boards. As well, a blank water sample was submitted with the sample set from each of the seven school boards. The water for the blank samples was de-ionized water supplied by the laboratories. All of the blank samples reported levels below detection with the exception of the blank from the Conseil Scolaire Acadien Provincial which reported a total Uranium of 0.07 µg/L which the laboratory rounded to 0.1µg/L.

The original and duplicate samples reported percent differences that ranged from 0 to 13 % with the exception of the original and duplicate Lead-210 results from Cabot High School which reported a percent difference of 33%. The results are acceptable and indicative of consistent laboratory analytical procedure.

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APPENDIX A

TABLES OF ANALYTICAL RESULTS

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	19-Jun-02	19-Jun-02	17-Sep-02	19-Sep-02	16-Sep-02	16-Sep-02
		School ID	425	425	425	326	304	
		Canadian Drinking Water Quality Guidelines (MAC) (1)	ATLANTIC MEMORIAL-TERENCE BAY	ATLANTIC MEMORIAL-TERENCE BAY (Duplicate)	ATLANTIC MEMORIAL-TERENCE BAY	ATLANTIC VIEW SCHOOL	BEAVERBANK-KINSAC	BEAVERBANK-KINSAC ANNEX
Radium-226	Bq/L	0.6	0.04	0.03	0.02	< 0.005	< 0.005	< 0.005
Lead-210	Bq/L	0.1	0.26	0.41	0.43	0.04	< 0.02	< 0.02
Total Uranium	µg/L	20	2	2.2	2	< 0.1	1.2	1.8
Total Activity Sum (2)	---	**≤ 1.0**	**2.68**	**4.16**	**4.35**	**0.40**	**0.01**	**0.01**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion factor
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	19-Jun-02	19-Jun-02	17-Sep-02	19-Sep-02	16-Sep-02	16-Sep-02
		School ID	425	425	425	326	304	
		Canadian Drinking Water Quality Guidelines (MAC) (1)	ATLANTIC MEMORIAL-TERENCE BAY	ATLANTIC MEMORIAL-TERENCE BAY (Duplicate)	ATLANTIC MEMORIAL-TERENCE BAY	ATLANTIC VIEW SCHOOL	BEAVERBANK-KINSAC	BEAVERBANK-KINSAC ANNEX
Radium-226	Bq/L	0.6	0.04	0.03	0.02	< 0.005	< 0.005	< 0.005
Lead-210	Bq/L	0.1	0.26	0.41	0.43	0.04	< 0.02	< 0.02
Total Uranium	µg/L	20	2	2.2	2	< 0.1	1.2	1.8
Total Activity Sum (2)	---	**< 1.0**	**2.68**	**4.16**	**4.35**	**0.40**	**0.01**	**0.01**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion factor
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	16-Sep-02	19-Sep-02	19-Jun-02	19-Jun-02	17-Sep-02
		School ID	752	322	286	286	286
		Canadian Drinking Water Quality Guidelines (MAC) (1)	BEAVERBANK-MONARCH DRIVE	BELL PARK ACADEMIC CENTRE	BROOKSIDE JUNIOR HIGH SCHOOL	BROOKSIDE JUNIOR HIGH SCHOOL (Duplicate)	BROOKSIDE JUNIOR HIGH SCHOOL
Radium-226	Bq/L	0.6	< 0.005	< 0.005	<0.005	<0.005	< 0.005
Lead-210	Bq/L	0.1	0.03	< 0.02	0.16	0.41	0.21
Total Uranium	µg/L	20	1.6	0.2	1	1.6	0.3
Total Activity Sum (2)	---	**≤ 1.0**	**0.31**	**0.00**	**1.61**	**4.11**	**2.10**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	19-Jun-02	19-Jun-02	17-Sep-02
		School ID	328	343	283	283	283
		Canadian Drinking Water Quality Guidelines (MAC) (1)	DUNCAN MACMILLAN HIGH SCHOOL	DUTCH SETTLEMENT ELEMENTARY	EAST ST MARGARET'S	EAST ST MARGARET'S (Duplicate)	EAST ST MARGARET'S
Radium-226	Bq/L	0.6	0.008	< 0.005	0.02	0.02	0.01
Lead-210	Bq/L	0.1	< 0.02	< 0.02	0.28	0.48	0.49
Total Uranium	µg/L	20	< 0.1	< 0.1	27	27	23
Total Activity Sum (2)	---	**≤ 1.0**	**0.01**	**0.00**	**3.00**	**5.00**	**5.06**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	16-Sep-02	19-Sep-02	19-Jun-02	19-Jun-02	17-Sep-02
		School ID	752	322	286	286	286
		Canadian Drinking Water Quality Guidelines (MAC) (1)	BEAVERBANK-MONARCH DRIVE	BELL PARK ACADEMIC CENTRE	BROOKSIDE JUNIOR HIGH SCHOOL	BROOKSIDE JUNIOR HIGH SCHOOL (Duplicate)	BROOKSIDE JUNIOR HIGH SCHOOL
Radium-226	Bq/L	0.6	< 0.005	< 0.005	<0.005	<0.005	< 0.005
Lead-210	Bq/L	0.1	0.03	< 0.02	0.16	0.41	0.21
Total Uranium	µg/L	20	1.6	0.2	1	1.6	0.3
Total Activity Sum (2)	---	**≤ 1.0**	**0.31**	**0.00**	**1.61**	**4.11**	**2.10**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02	19-Jun-02	19-Jun-02	17-Sep-02
		School ID	328	343	283	283	283
		Canadian Drinking Water Quality Guidelines (MAC) (1)	DUNCAN MACMILLAN HIGH SCHOOL	DUTCH SETTLEMENT ELEMENTARY	EAST ST MARGARET'S	EAST ST MARGARET'S (Duplicate)	EAST ST MARGARET'S
Radium-226	Bq/L	0.6	0.008	< 0.005	0.02	0.02	0.01
Lead-210	Bq/L	0.1	< 0.02	< 0.02	0.28	0.48	0.49
Total Uranium	µg/L	20	< 0.1	< 0.1	27	27	23
Total Activity Sum (2)	---	**< 1.0**	**0.01**	**0.00**	**3.00**	**5.00**	**5.06**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	18-Sep-02	19-Sep-02	19-Sep-02	16-Sep-02	19-Jun-02
		School ID	329	334	356	314	306
		Canadian Drinking Water Quality Guidelines (MAC) (1)	EASTERN CONSOLIDATED	EASTERN SHORE DISTRICT HIGH	GAETZ BROOK JUNIOR HIGH SCHOOL	GEORGES P VANIER	HAMMONDS PLAINS
Radium-226	Bq/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	<0.005
Lead-210	Bq/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	<0.02
Total Uranium	µg/L	20	0.2	< 0.1	0.1	< 0.1	<0.5
Total Activity Sum (2)	---	≤ **1.0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	18-Sep-02	19-Jun-02	19-Jun-02	20-Sep-02	16-Sep-02
		School ID	335	296	296	296	313
		Canadian Drinking Water Quality Guidelines (MAC) (1)	HARBOURSIDE ELEMENTARY	HARRIETSFIELD ELEMENTARY	HARRIETSFIELD ELEMENTARY (Duplicate)	HARRIETSFIELD ELEMENTARY	HARRY R HAMILTON SCHOOL
Radium-226	Bq/L	0.6	0.006	0.008	0.01	< 0.005	< 0.005
Lead-210	Bq/L	0.1	0.06	0.17	0.22	0.28	0.05
Total Uranium	µg/L	20	0.8	81	84	87	< 0.1
Total Activity Sum (2)	---	≤ 1.0	**0.62**	**2.22**	**2.74**	**3.34**	**0.50**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	18-Sep-02	19-Jun-02	19-Jun-02	20-Sep-02	16-Sep-02
		School ID	335	296	296	296	313
		Canadian Drinking Water Quality Guidelines (MAC) (1)	HARBOURSIDE ELEMENTARY	HARRIETSFIELD ELEMENTARY	HARRIETSFIELD ELEMENTARY (Duplicate)	HARRIETSFIELD ELEMENTARY	HARRY R HAMILTON SCHOOL
Radium-226	Bq/L	0.6	0.006	0.008	0.01	< 0.005	< 0.005
Lead-210	Bq/L	0.1	0.06	0.17	0.22	0.28	0.05
Total Uranium	µg/L	20	0.8	81	84	87	< 0.1
Total Activity Sum (2)	---	≤ 1.0	**0.62**	**2.22**	**2.74**	**3.34**	**0.50**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	19-Jun-02	19-Jun-02	17-Sep-02	16-Sep-02	18-Sep-02
		School ID	293	293	293	747	330
		Canadian Drinking Water Quality Guidelines (MAC) (1)	HERRING COVE Jr. High	HERRING COVE Jr. High (Duplicate)	HERRING COVE Jr. High	HOLLAND ROAD ELEMENTARY SCHOOL	LAKEFRONT CONSOLIDATED
Radium-226	Bq/L	0.6	0.04	0.04	0.03	0.02	0.03
Lead-210	Bq/L	0.1	0.17	0.21	0.19	< 0.02	0.05
Total Uranium	µg/L	20	3.6	4.2	4.2	1.7	2.6
Total Activity Sum (2)	---	≤ 1.0	**1.79**	**2.19**	**1.98**	**0.04**	**0.57**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	19-Jun-02	19-Jun-02	17-Sep-02	16-Sep-02	18-Sep-02
		School ID	293	293	293	747	330
		Canadian Drinking Water Quality Guidelines (MAC) (1)	HERRING COVE Jr. High	HERRING COVE Jr. High (Duplicate)	HERRING COVE Jr. High	HOLLAND ROAD ELEMENTARY SCHOOL	LAKEFRONT CONSOLIDATED
Radium-226	Bq/L	0.6	0.04	0.04	0.03	0.02	0.03
Lead-210	Bq/L	0.1	0.17	0.21	0.19	< 0.02	0.05
Total Uranium	µg/L	20	3.6	4.2	4.2	1.7	2.6
Total Activity Sum (2)	---	**≤ 1.0**	**1.79**	**2.19**	**1.98**	**0.04**	**0.57**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	19-Sep-02	19-Sep-02	20-Sep-02	18-Sep-02	26-Sep-02
		School ID	338	340	342	348	131
		Canadian Drinking Water Quality Guidelines (MAC) (1)	LAKEVIEW CONSOLIDATED SCHOOL	MUSQUODOBOIT HARBOUR ELEMENT	MUSQUODOBOIT RURAL HIGH SCHOOL	MUSQUODOBOIT VALLEY EDUCATION CENTRE	O'CONNELL DRIVE ELEMENTARY
Radium-226	Bq/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lead-210	Bq/L	0.1	0.05	< 0.02	< 0.02	< 0.02	0.04
Total Uranium	µg/L	20	0.6	0.6	0.6	< 0.1	< 0.1
Total Activity Sum (2)	---	**≤ 1.0**	**0.50**	**0.00**	**0.00**	**0.00**	**0.40**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	20-Sep-02	18-Sep-02	18-Sep-02	24-Jun-02	24-Jun-02
		School ID	315	340	340	295	295
		Canadian Drinking Water Quality Guidelines (MAC) (1)	OLDFIELD CONSOLIDATED SCHOOL	R. JAMIESON	JEDDORE-LAKEVILLE SCHOOL	SAMBRO ELEMENTARY SCHOOL	SAMBRO ELEMENTARY SCHOOL (Duplicate)
Radium-226	Bq/L	0.6	0.07	< 0.005	< 0.005	0.04	0.03
Lead-210	Bq/L	0.1	< 0.02	< 0.02	< 0.02	0.09	0.07
Total Uranium	µg/L	20	1.8	0.5	0.6	0.5	0.6
Total Activity Sum (2)	---	≤ 1.0	**0.13**	**0.00**	**0.00**	**0.97**	**0.75**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	17-Sep-02	18-Sep-02	26-Mar-02	28-Mar-02	10-Jun-02
		School ID	287	332	277	277	277
		Canadian Drinking Water Quality Guidelines (MAC) (1)	SHATFORD MEMORIAL ELEM SCHOOL	SHEET HARBOUR CONSOLIDATED	SIR JOHN A MACDONALD	SIR JOHN A MACDONALD	SIR JOHN A MACDONALD
Radium-226	Bq/L	0.6	0.03	< 0.005	0.03	0.02	0.009
Lead-210	Bq/L	0.1	0.06	0.03	0.25	0.04	0.15
Total Uranium	µg/L	20	0.8	1.1	6.2	4.6	2.7
Total Activity Sum (2)	---	**≤ 1.0**	**0.66**	**0.31**	**2.59**	**0.46**	**1.53**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	17-Sep-02	18-Sep-02	26-Mar-02	28-Mar-02	10-Jun-02
		School ID	287	332	277	277	277
		Canadian Drinking Water Quality Guidelines (MAC) (1)	SHATFORD MEMORIAL ELEM SCHOOL	SHEET HARBOUR CONSOLIDATED	SIR JOHN A MACDONALD	SIR JOHN A MACDONALD	SIR JOHN A MACDONALD
Radium-226	Bq/L	0.6	0.03	< 0.005	0.03	0.02	0.009
Lead-210	Bq/L	0.1	0.06	0.03	0.25	0.04	0.15
Total Uranium	µg/L	20	0.8	1.1	6.2	4.6	2.7
Total Activity Sum (2)	---	< 1.0	**0.66**	**0.31**	**2.59**	**0.46**	**1.53**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	19-Jun-02	19-Jun-02	08-Jul-02	11-Oct-02	19-Jun-02
		School ID	277	277	277	277	284
		Canadian Drinking Water Quality Guidelines (MAC) (1)	SIR JOHN A MACDONALD	SIR JOHN A MACDONALD (DUPLICATE)	SIR JOHN A MACDONALD	SIR JOHN A MACDONALD	TANTALLON ELEMENTARY SCHOOL
Radium-226	Bq/L	0.6	0.008	0.02	0.006		0.01
Lead-210	Bq/L	0.1	0.2	0.27	0.18	0.18	0.08
Total Uranium	µg/L	20	3.2	4.1	7.7	4.2	1
Total Activity Sum (2)	---	**≤ 1.0**	**2.03**	**2.76**	**1.86**	**1.83**	**0.82**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	19-Jun-02	19-Jun-02	16-Sep-02	19-Jun-02	19-Jun-02
		School ID	288	288	288	289	289
		Canadian Drinking Water Quality Guidelines (MAC) (1)	TANTALLON JUNIOR HIGH SCHOOL	TANTALLON JUNIOR HIGH SCHOOL (Duplicate)	TANTALLON JUNIOR HIGH SCHOOL	TERRANCE BAY SCHOOL	TERRANCE BAY SCHOOL (Duplicate)
Radium-226	Bq/L	0.6	<0.005	<0.005	< 0.005	0.03	0.02
Lead-210	Bq/L	0.1	0.24	0.38	0.49	0.44	0.68
Total Uranium	µg/L	20	<0.5	<0.5	0.2	12	13
Total Activity Sum (2)	---	**≤ 1.0**	**2.40**	**3.80**	**4.90**	**4.53**	**6.91**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	19-Jun-02	19-Jun-02	08-Jul-02	11-Oct-02	19-Jun-02
		School ID	277	277	277	277	284
		Canadian Drinking Water Quality Guidelines (MAC) (1)	SIR JOHN A MACDONALD	SIR JOHN A MACDONALD (DUPLICATE)	SIR JOHN A MACDONALD	SIR JOHN A MACDONALD	TANTALLON ELEMENTARY SCHOOL
Radium-226	Bq/L	0.6	0.008	0.02	0.006		0.01
Lead-210	Bq/L	0.1	0.2	0.27	0.18	0.18	0.08
Total Uranium	µg/L	20	3.2	4.1	7.7	4.2	1
Total Activity Sum (2)	---	**≤ 1.0**	**2.03**	**2.76**	**1.86**	**1.83**	**0.82**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	19-Jun-02	19-Jun-02	16-Sep-02	19-Jun-02	19-Jun-02
		School ID	288	288	288	289	289
		Canadian Drinking Water Quality Guidelines (MAC) (1)	TANTALLON JUNIOR HIGH SCHOOL	TANTALLON JUNIOR HIGH SCHOOL (Duplicate)	TANTALLON JUNIOR HIGH SCHOOL	TERRANCE BAY SCHOOL	TERRANCE BAY SCHOOL (Duplicate)
Radium-226	Bq/L	0.6	<0.005	<0.005	< 0.005	0.03	0.02
Lead-210	Bq/L	0.1	0.24	0.38	0.49	0.44	0.68
Total Uranium	µg/L	20	<0.5	<0.5	0.2	12	13
Total Activity Sum (2)	---	**< 1.0**	**2.40**	**3.80**	**4.90**	**4.53**	**6.91**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	17-Sep-02	18-Sep-02	19-Sep-02	19-Jun-02	19-Jun-02
		School ID	289	349	337	294	294
		Canadian Drinking Water Quality Guidelines (MAC) (1)	TERRANCE BAY SCHOOL	UPPER MUSQUODOBOIT	WEST CHEZZETCOOK SCHOOL	WILLIAM KING ELEMENTARY SCHOOL	WILLIAM KING ELEMENTARY SCHOOL (Duplicate)
Radium-226	Bq/L	0.6	0.006	< 0.005	0.007	0.04	0.06
Lead-210	Bq/L	0.1	0.65	< 0.02	0.04	0.35	0.4
Total Uranium	µg/L	20	12	< 0.1	< 0.1	13	17
Total Activity Sum (2)	---	**≤ 1.0**	**6.59**	**0.00**	**0.41**	**3.65**	**4.21**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	17-Sep-02	19-Jun-02	19-Jun-02	17-Sep-02	17-Sep-02
		School ID	294	282	282	282	282
		Canadian Drinking Water Quality Guidelines (MAC) (1)	WILLIAM KING ELEMENTARY SCHOOL	PROSPECT ROAD ELEMENTARY	PROSPECT ROAD ELEMENTARY (Duplicate)	PROSPECT ROAD ELEMENTARY	R CURRAN ELEMENTARY (Duplicate)
Radium-226	Bq/L	0.6	0.08	<0.005	<0.005	< 0.005	< 0.005
Lead-210	Bq/L	0.1	0.38	0.24	0.41	0.45	0.39
Total Uranium	µg/L	20	18	2.3	2.6	2.3	2.6
Total Activity Sum (2)	---	**≤ 1.0**	**4.05**	**2.41**	**4.12**	**4.51**	**3.92**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	17-Sep-02	18-Sep-02	19-Sep-02	19-Jun-02	19-Jun-02
		School ID	289	349	337	294	294
		Canadian Drinking Water Quality Guidelines (MAC) (1)	TERRANCE BAY SCHOOL	UPPER MUSQUODOBOIT	WEST CHEZZETCOOK SCHOOL	WILLIAM KING ELEMENTARY SCHOOL	WILLIAM KING ELEMENTARY SCHOOL (Duplicate)
Radium-226	Bq/L	0.6	0.006	< 0.005	0.007	0.04	0.06
Lead-210	Bq/L	0.1	0.65	< 0.02	0.04	0.35	0.4
Total Uranium	µg/L	20	12	< 0.1	< 0.1	13	17
Total Activity Sum (2)	---	**≤ 1.0**	**6.59**	**0.00**	**0.41**	**3.65**	**4.21**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	17-Sep-02	19-Jun-02	19-Jun-02	17-Sep-02	17-Sep-02
		School ID	294	282	282	282	282
		Canadian Drinking Water Quality Guidelines (MAC) (1)	WILLIAM KING ELEMENTARY SCHOOL	PROSPECT ROAD ELEMENTARY	PROSPECT ROAD ELEMENTARY (Duplicate)	PROSPECT ROAD ELEMENTARY	R CURRAN ELEMENTARY (Duplicate)
Radium-226	Bq/L	0.6	0.08	<0.005	<0.005	< 0.005	< 0.005
Lead-210	Bq/L	0.1	0.38	0.24	0.41	0.45	0.39
Total Uranium	µg/L	20	18	2.3	2.6	2.3	2.6
Total Activity Sum (2)	---	**< 1.0**	**4.05**	**2.41**	**4.12**	**4.51**	**3.92**

TABLE 5 - HALIFAX REGIONAL

Parameter	Units	Sample Date	17-Sep-02
		School ID	
		Canadian Drinking Water Quality Guidelines (MAC) (1)	CAROLE OLSEN ELEMENTARY (Blank)
Radium-226	Bq/L	0.6	< 0.005
Lead-210	Bq/L	0.1	< 0.02
Total Uranium	µg/L	20	< 0.1
Total Activity Sum (2)	---	**≤ 1.0**	**0.00**

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NOVA SCOTIA
Transportation and Public Works
Environmental Services

RADIONUCLIDE MONITORING PROGRAM FOR DRINKING WATER IN NOVA SCOTIA SCHOOLS – SEPTEMBER 2002 NOVA SCOTIA DEPARTMENT OF EDUCATION

Prepared For:

Nova Scotia Dept. of Education

Prepared by:

Environmental Services
Nova Scotia Dept. of Transportation and Public Works
Halifax, N.S.
November 2002

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1.0 BACKGROUND

At the request of the Nova Scotia Department of Education (NSDOE), the Environmental Services section of the Nova Scotia Department of Transportation and Public Works (NSDTPW) was asked to coordinate the collection and reporting of the water sampling for the Radionuclide Monitoring Program for Drinking Water in Nova Scotia Schools.

This report includes the results from the Fall (September) 2002 round of sampling. Water samples were collected from 145 schools, province wide, from the seven school boards and from P3 schools. It is our understanding that all samples were collected according to the Special Water Advisory Group (SWAG) sampling requirements.

Samples were delivered to PSC Analytical Services in Bedford and the Environmental Services Laboratory at the Queen Elizabeth II Health Sciences Centre in Halifax. Laboratory personnel preserved the samples with nitric acid. Samples from both laboratories were submitted to SRC Analytical (SRC) in Saskatoon, Saskatchewan. SRC held the samples for 30 days prior to testing, as per their recommended laboratory procedure. The sample from St. Margaret's Bay Elementary School was not held for 30 days as it was collected prior to the Special Well-Water Advisory Group (SWAG) decision to follow the 30 day protocol. Samples were analysed for Radium-226, Lead-210 and total Uranium. Laboratory certificates of analysis are included in Appendix B.

2.0 RESULTS

The results from the Fall (September) 2002 round of water sampling are grouped according to school board and are included in Tables 1 through 8 in Appendix A. Results from previous sampling programs were included in the tables for comparison purposes. Analytical results were compared to the 2002 Canadian Drinking Water Quality Guidelines (CDWQG). A Total Activity Sum was calculated using the procedure defined in the CDWQG. The total Uranium results were converted from a concentration (mg/L) to an activity (Bq/L) using the CDWQG relationship that states that for

natural Uranium 0.02 mg/L is about 0.5 Bq/L. The calculated activities were divided by the maximum acceptable concentration (MAC) for Uranium (4 Bq/L) and included in the activity sum.

In Summary, all analytical results were below guidelines from the Southwest Regional School Board with the exception of New Ross Consolidated which reported Lead-210 of 0.17 Bq/L and total Uranium at 120 µg/L in the untreated bathroom supply and Lead-210 of 0.13 Bq/L at the treated water fountain and Big Tancook Elementary School and the Big Tancook duplicate (Steve Stodart) which reported Lead-210 at 0.18 and 0.17 Bq/L, respectively.

3.0 QA/QC

The analytical QA/QC program consisted of the collection of a duplicate water sample at one school in each of the seven school boards. As well, a blank water sample was submitted with the sample set from each of the seven school boards. The water for the blank samples was de-ionized water supplied by the laboratories. All of the blank samples reported levels below detection with the exception of the blank from the Conseil Scolaire Acadien Provincial which reported a total Uranium of 0.07 µg/L which the laboratory rounded to 0.1µg/L.

The original and duplicate samples reported percent differences that ranged from 0 to 13 % with the exception of the original and duplicate Lead-210 results from Cabot High School which reported a percent difference of 33%. The results are acceptable and indicative of consistent laboratory analytical procedure.

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APPENDIX A

TABLES OF ANALYTICAL RESULTS

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02
		School ID	981	491	500	167	255	166
		Canadian Drinking Water Quality Guidelines (MAC) (1)	DRUMLIN HEIGHTS CONSOLIDATED	ST MARY'S BAY ACADEMY	ARCADIA CONSOLIDATED SCHOOL	BARRINGTON MUNICIPAL	BARTON CONSOLIDATED SCHOOL	CAPE SABLE ISLAND
Radium-226	Bq/L	0.6	<0.005	<0.005	0.006	<0.005	0.01	<0.005
Lead-210	Bq/L	0.1	<0.02	<0.02	0.02	0.06	<0.02	0.06
Total Uranium	µg/L	20	0.6	<0.5	<0.5	1.7	<0.5	14
Total Activity Sum (2)	—	**≤ 1.0**	**0.00**	**0.00**	**0.21**	**0.61**	**0.02**	**0.69**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion factor
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02
		School ID	497	399	216	207	511	257
		Canadian Drinking Water Quality Guidelines (MAC) (1)	CARLETON CONSOLIDATED SCHOOL	CENTRE CONSOLIDATED SCHOOL	CHESTER AREA MIDDLE SCHOOL	CHESTER DISTRICT ELEMENTARY SCHOOL	CLARK'S HARBOUR	DIGBY NECK CONSOLIDATED SCHOOL
Radium-226	Bq/L	0.6	<0.005	0.005	<0.005	<0.005	0.04	<0.005
Lead-210	Bq/L	0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Uranium	µg/L	20	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Total Activity Sum (2)	---	≤ 1.0	**0.00**	**0.01**	**0.00**	**0.00**	**0.07**	**0.00**

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02
		School ID	733	80	210	458	222	917
		Canadian Drinking Water Quality Guidelines (MAC) (1)	EVELYN RICHARDSON MEMORIAL	FOREST HEIGHTS	GOLD RIVER ELEMENTARY	GREENFIELD ELEMENTARY	HAVELOCK SCHOOL	HEBBVILLE ACADEMY
Radium-226	Bq/L	0.6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	<0.02	<0.02	<0.02	0.05	<0.02	<0.02
Total Uranium	µg/L	20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Activity Sum (2)	—	**≤ 1.0**	**0.00**	**0.00**	**0.00**	**0.50**	**0.00**	**0.00**

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02
		School ID	395	259	465	463	397	402
		Canadian Drinking Water Quality Guidelines (MAC) (1)	HEBBVILLE ELEMENTARY	ISLANDS CONSOLIDATED SCHOOL	MILL VILLAGE	MILTON CENTENNIAL SCHOOL	NEW GERMANY ELEMENTARY SCHOOL	NEW GERMANY RURAL HIGH SCHOOL
Radium-226	Bq/L	0.6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	<0.02	<0.02	<0.02	<0.02	0.03	<0.02
Total Uranium	µg/L	20	<0.5	<0.5	<0.5	<0.5	<0.5	0.7
Total Activity Sum (2)	---	≤ 1.0	**0.00**	**0.00**	**0.00**	**0.00**	**0.30**	**0.00**

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	24-Jun-02	20-Sep-02	20-Sep-02	24-Jun-02	24-Jun-02	24-Jun-02
		School ID	214	214	214	404	460	400
		Canadian Drinking Water Quality Guidelines (MAC) (1)	NEW ROSS CONSOLIDATED SCHOOL	NEW ROSS CONSOLIDATED SCHOOL UD BATHROOM	NEW ROSS CONSOLIDATED SCHOOL TD FOUNTAIN	NEWCOMBVILLE ELEMENTARY	NORTH QUEENS ELEMENTARY SCHOOL	PENTZ ELEMENTARY SCHOOL
Radium-226	Bq/L	0.6	<0.005	0.06	0.02	0.01	<0.005	<0.005
Lead-210	Bq/L	0.1	0.08	0.17	0.13	<0.02	0.02	<0.02
Total Uranium	µg/L	20	3.6	120	14	<0.5	<0.5	<0.5
Total Activity Sum (2)	---	**≤ 1.0**	**0.82**	**2.55**	**1.42**	**0.02**	**0.20**	**0.00**

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	24-Jun-02	20-Sep-02	20-Sep-02	24-Jun-02	24-Jun-02	24-Jun-02
		School ID	214	214	214	404	460	400
		Canadian Drinking Water Quality Guidelines (MAC) (1)	NEW ROSS CONSOLIDATED SCHOOL	NEW ROSS CONSOLIDATED SCHOOL UD BATHROOM	NEW ROSS CONSOLIDATED SCHOOL TD FOUNTAIN	NEWCOMBVILLE ELEMENTARY	NORTH QUEENS ELEMENTARY SCHOOL	PENTZ ELEMENTARY SCHOOL
Radium-226	Bq/L	0.6	<0.005	0.06	0.02	0.01	<0.005	<0.005
Lead-210	Bq/L	0.1	0.08	0.17	0.13	<0.02	0.02	<0.02
Total Uranium	µg/L	20	3.6	120	14	<0.5	<0.5	<0.5
Total Activity Sum (2)	---	**≤ 1.0**	**0.82**	**2.55**	**1.42**	**0.02**	**0.20**	**0.00**

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02
		School ID	401	199	498	439	493	392
		Canadian Drinking Water Quality Guidelines (MAC) (1)	PETITE RIVIERE ELEMENTARY	PLYMOUTH SCHOOL	PORT MAITLAND	QUEENS ADULT CENTRE (MILTON)	RAGGED ISLAND	RIVERPORT & DISTRICT
Radium-226	Bq/L	0.6	0.01	<0.005	0.03	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	0.05	<0.03	<0.02	<0.02	0.05	<0.02
Total Uranium	µg/L	20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Activity Sum (2)	---	≤ 1.0	**0.52**	**0.00**	**0.05**	**0.00**	**0.50**	**0.00**

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	18-Sep-02
		School ID	394	258	256	405	405	405
		Canadian Drinking Water Quality Guidelines (MAC) (1)	WEST NORTHFIELD ELEMENTARY	WESTPORT VILLAGE SCHOOL	WEYMOUTH CONSOLIDATED SCHOOL	BIG TANCOOK ELEMENTARY SCHOOL	BIG TANCOOK ELEMENTARY SCHOOL (Duplicate)	BIG TANCOOK ELEMENTARY SCHOOL
Radium-226	Bq/L	0.6	<0.005	<0.005	0.005	0.04	0.05	0.04
Lead-210	Bq/L	0.1	<0.02	<0.02	<0.02	0.22	0.21	0.18
Total Uranium	µg/L	20	<0.5	<0.5	2.2	0.8	0.5	0.7
Total Activity Sum (2)	---	≤ 1.0	**0.00**	**0.00**	**0.02**	**2.27**	**2.19**	**1.87**

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	24-Jun-02	18-Sep-02
		School ID	394	258	256	405	405	405
		Canadian Drinking Water Quality Guidelines (MAC) (1)	WEST NORTHFIELD ELEMENTARY	WESTPORT VILLAGE SCHOOL	WEYMOUTH CONSOLIDATED SCHOOL	BIG TANCOOK ELEMENTARY SCHOOL	BIG TANCOOK ELEMENTARY SCHOOL (Duplicate)	BIG TANCOOK ELEMENTARY SCHOOL
Radium-226	Bq/L	0.6	<0.005	<0.005	0.005	0.04	0.05	0.04
Lead-210	Bq/L	0.1	<0.02	<0.02	<0.02	0.22	0.21	0.18
Total Uranium	µg/L	20	<0.5	<0.5	2.2	0.8	0.5	0.7
Total Activity Sum (2)	—	≤ 1.0	**0.00**	**0.00**	**0.02**	**2.27**	**2.19**	**1.87**

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02
		School ID		
		Canadian Drinking Water Quality Guidelines (MAC) (1)	STEVE STODART (Duplicate)	LEROY LEGERE (Blank)
Radium-226	Bq/L	0.6	0.04	< 0.005
Lead-210	Bq/L	0.1	0.17	< 0.02
Total Uranium	µg/L	20	0.7	< 0.1
Total Activity Sum (2)	--	< 1.0	**1.77**	**0.00**

TABLE 6 - SOUTHWEST REGIONAL

Parameter	Units	Sample Date	18-Sep-02	18-Sep-02
		School ID		
		Canadian Drinking Water Quality Guidelines (MAC) (1)	STEVE STODART (Duplicate)	LEROY LEGERE (Blank)
Radium-226	Bq/L	0.6	0.04	< 0.005
Lead-210	Bq/L	0.1	0.17	< 0.02
Total Uranium	µg/L	20	0.7	< 0.1
Total Activity Sum (2)	---	**≤ 1.0**	**1.77**	**0.00**

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NOVA SCOTIA
Transportation and Public Works
Environmental Services

RADIONUCLIDE MONITORING PROGRAM
FOR DRINKING WATER IN NOVA SCOTIA SCHOOLS – SEPTEMBER 2002
NOVA SCOTIA DEPARTMENT OF EDUCATION

Prepared For:

Nova Scotia Dept. of Education

Prepared by:

Environmental Services
Nova Scotia Dept. of Transportation
and Public Works
Halifax, N.S.
November 2002

CONFIDENTIAL

1.0 BACKGROUND

At the request of the Nova Scotia Department of Education (NSDOE), the Environmental Services section of the Nova Scotia Department of Transportation and Public Works (NSDTPW) was asked to coordinate the collection and reporting of the water sampling for the Radionuclide Monitoring Program for Drinking Water in Nova Scotia Schools.

This report includes the results from the Fall (September) 2002 round of sampling. Water samples were collected from 145 schools, province wide, from the seven school boards and from P3 schools. It is our understanding that all samples were collected according to the Special Water Advisory Group (SWAG) sampling requirements.

Samples were delivered to PSC Analytical Services in Bedford and the Environmental Services Laboratory at the Queen Elizabeth II Health Sciences Centre in Halifax. Laboratory personnel preserved the samples with nitric acid. Samples from both laboratories were submitted to SRC Analytical (SRC) in Saskatoon, Saskatchewan. SRC held the samples for 30 days prior to testing, as per their recommended laboratory procedure. The sample from St. Margaret's Bay Elementary School was not held for 30 days as it was collected prior to the Special Well-Water Advisory Group (SWAG) decision to follow the 30 day protocol. Samples were analysed for Radium-226, Lead-210 and total Uranium. Laboratory certificates of analysis are included in Appendix B.

2.0 RESULTS

The results from the Fall (September) 2002 round of water sampling are grouped according to school board and are included in Tables 1 through 8 in Appendix A. Results from previous sampling programs were included in the tables for comparison purposes. Analytical results were compared to the 2002 Canadian Drinking Water Quality Guidelines (CDWQG). A Total Activity Sum was calculated using the procedure defined in the CDWQG. The total Uranium results were converted from a concentration (mg/L) to an activity (Bq/L) using the CDWQG relationship that states that for

natural Uranium 0.02 mg/L is about 0.5 Bq/L. The calculated activities were divided by the maximum acceptable concentration (MAC) for Uranium (4 Bq/L) and included in the activity sum.

All analytical results from the Strait Regional School Board schools were reported as below guidelines.

3.0 QA/QC

The analytical QA/QC program consisted of the collection of a duplicate water sample at one school in each of the seven school boards. As well, a blank water sample was submitted with the sample set from each of the seven school boards. The water for the blank samples was de-ionized water supplied by the laboratories. All of the blank samples reported levels below detection with the exception of the blank from the Conseil Scolaire Acadien Provincial which reported a total Uranium of 0.07 µg/L which the laboratory rounded to 0.1µg/L.

The original and duplicate samples reported percent differences that ranged from 0 to 13 % with the exception of the original and duplicate Lead-210 results from Cabot High School which reported a percent difference of 33%. The results are acceptable and indicative of consistent laboratory analytical procedure.

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APPENDIX A

TABLES OF ANALYTICAL RESULTS

TABLE 7 - STRAIT REGIONAL

Parameter	Units	Sample Date	19-Sep-02	19-Sep-02	19-Sep-02	19-Sep-02	19-Sep-02
		School ID	974	260	975	479	143
		Canadian Drinking Water Quality Guidelines (MAC) (1)	C.B. HIGHLANDS ACADEMY/EDUCATION CENTRE (BELLE COTE)	CHEDABUCTO EDUCATION CENTRE	EAST ANTIGONISH ACADEMY/ EDUCATION CENTRE	FRAMBOISE SCHOOL	H M MACDONALD ELEMENTARY
Radium-226	Bq/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	0.006
Lead-210	Bq/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	< 0.1	< 0.1	0.8	< 0.1	0.3
Total Activity Sum (2)	---	**≤ 1.0**	**0.00**	**0.00**	**0.01**	**0.00**	**0.01**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion factor
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 7 - STRAIT REGIONAL

Parameter	Units	Sample Date	19-Sep-02	19-Sep-02	19-Sep-02	19-Sep-02	19-Sep-02
		School ID	390	263	146		
		Canadian Drinking Water Quality Guidelines (MAC) (1)	PLEASANT BAY SCHOOL	RIVERVIEW CONSOLIDATED SCHOOL	REV H J MACDONALD SCHOOL	T. DOYLE EDUCATION CENTRE (Duplicate)	KENNETH MECH ELEMENTARY (Blank)
Radium-226	Bq/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lead-210	Bq/L	0.1	0.06	< 0.02	< 0.02	< 0.02	< 0.02
Total Uranium	µg/L	20	9.6	< 0.1	0.4	0.4	< 0.1
Total Activity Sum (2)	---	**≤ 1.0**	**0.66**	**0.00**	**0.00**	**0.00**	**0.00**

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NOVA SCOTIA
Transportation and Public Works
Environmental Services

RADIONUCLIDE MONITORING PROGRAM FOR DRINKING WATER IN NOVA SCOTIA SCHOOLS – SEPTEMBER 2002 NOVA SCOTIA DEPARTMENT OF EDUCATION

Prepared For:

Nova Scotia Dept. of Education

Prepared by:

Environmental Services
Nova Scotia Dept. of Transportation and Public Works
Halifax, N.S.
November 2002

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1.0 BACKGROUND

At the request of the Nova Scotia Department of Education (NSDOE), the Environmental Services section of the Nova Scotia Department of Transportation and Public Works (NSDTPW) was asked to coordinate the collection and reporting of the water sampling for the Radionuclide Monitoring Program for Drinking Water in Nova Scotia Schools.

This report includes the results from the Fall (September) 2002 round of sampling. Water samples were collected from 145 schools, province wide, from the seven school boards and from P3 schools. It is our understanding that all samples were collected according to the Special Water Advisory Group (SWAG) sampling requirements.

Samples were delivered to PSC Analytical Services in Bedford and the Environmental Services Laboratory at the Queen Elizabeth II Health Sciences Centre in Halifax. Laboratory personnel preserved the samples with nitric acid. Samples from both laboratories were submitted to SRC Analytical (SRC) in Saskatoon, Saskatchewan. SRC held the samples for 30 days prior to testing, as per their recommended laboratory procedure. The sample from St. Margaret's Bay Elementary School was not held for 30 days as it was collected prior to the Special Well-Water Advisory Group (SWAG) decision to follow the 30 day protocol. Samples were analysed for Radium-226, Lead-210 and total Uranium. Laboratory certificates of analysis are included in Appendix B.

2.0 RESULTS

The results from the Fall (September) 2002 round of water sampling are grouped according to school board and are included in Tables 1 through 8 in Appendix A. Results from previous sampling programs were included in the tables for comparison purposes. Analytical results were compared to the 2002 Canadian Drinking Water Quality Guidelines (CDWQG). A Total Activity Sum was calculated using the procedure defined in the CDWQG. The total Uranium results were converted from a concentration (mg/L) to an activity (Bq/L) using the CDWQG relationship that states that for

natural Uranium 0.02 mg/L is about 0.5 Bq/L. The calculated activities were divided by the maximum acceptable concentration (MAC) for Uranium (4 Bq/L) and included in the activity sum.

In summary, all the analytical results from the P3 schools (Lockview High School and St. Margaret's Bay Elementary) were reported as below guidelines.

3.0 QA/QC

The analytical QA/QC program consisted of the collection of a duplicate water sample at one school in each of the seven school boards. As well, a blank water sample was submitted with the sample set from each of the seven school boards. The water for the blank samples was de-ionized water supplied by the laboratories. All of the blank samples reported levels below detection with the exception of the blank from the Conseil Scolaire Acadien Provincial which reported a total Uranium of 0.07 µg/L which the laboratory rounded to 0.1µg/L.

The original and duplicate samples reported percent differences that ranged from 0 to 13 % with the exception of the original and duplicate Lead-210 results from Cabot High School which reported a percent difference of 33%. The results are acceptable and indicative of consistent laboratory analytical procedure.

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APPENDIX A

TABLES OF ANALYTICAL RESU S

TABLE 8 - P3

Parameter	Units	Sample Date	17-Oct-02	19-Jun-02	19-Jun-02	12-Sep-02
		School ID		940	940	940
		Canadian Drinking Water Quality Guidelines (MAC) (1)	LOCKVIEW HIGH SCHOOL	ST MARGARET'S BAY ELEMENTARY	ST MARGARET'S BAY ELEMENTARY (DUPLICATE)	ST MARGARET'S BAY ELEMENTARY
Radium-226	Bq/L	0.6	<0.005	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	<0.02	0.26	0.27	0.07
Total Uranium	µg/L	20	<0.1	0.7	0.6	<0.5
Total Activity Sum (2)	---	**≤ 1.0**	**0.00**	**0.00**	**0.00**	**0.00**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion factor
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 8 - P3

Parameter	Units	Sample Date	17-Oct-02	19-Jun-02	19-Jun-02	12-Sep-02
		School ID		940	940	940
		Canadian Drinking Water Quality Guidelines (MAC) (1)	LOCKVIEW HIGH SCHOOL	ST MARGARET'S BAY ELEMENTARY	ST MARGARET'S BAY ELEMENTARY (DUPLICATE)	ST MARGARET'S BAY ELEMENTARY
Radium-226	Bq/L	0.6	<0.005	<0.005	<0.005	<0.005
Lead-210	Bq/L	0.1	<0.02	0.26	0.27	0.07
Total Uranium	µg/L	20	<0.1	0.7	0.6	<0.5
Total Activity Sum (2)	---	**≤ 1.0**	**0.00**	**0.00**	**0.00**	**0.00**

(1) Guidelines taken from *2002 Summary of Canadian Drinking Water Guidelines*
(2) Radionuclides below the detection limit are set to zero,
those above the detection limit are divided by the MAC (Maximum Acceptable Concentration)
and added in summation. Natural uranium of 0.02 mg/L = 0.5 Bq/L was used as a conversion factor
for uranium concentration to activity. A uranium MAC of 4 Bq/L was used
in the Total Activity Sum calculation.
Shading indicates a guideline exceedence

TABLE 8 - P3

Parameter	Units	Sample Date School ID Canadian Drinking Water Quality Guidelines (MAC) (1)
Radium-226	Bq/L	0.6
Lead-210	Bq/L	0.1
Total Uranium	µg/L	20
Total Activity Sum (2)	---	**≤ 1.0**